Everything Else Is Secondary – Revisited

Rick Lindsay, SSI Director

If you look back in your old SSI Newsletters about a year and a half you will find a series of articles from our Surge Protective Device (SPD) Basic Series which ran from April 2011 through January 2012. In the series I discussed the various claims and smoke screens that are advanced by our competitors in an effort to promote their own agendas and to distract you from the core principle of transient voltage surge suppression. It is simply to reduce the transient voltage surge energy (let through voltage) to a level that is not damaging to the load equipment. In today's electrical environments that means lower let through voltages. Anything else is secondary!

Well, we just ran across another one and this one is a REAL winner!

This came to us through various credible sources. It has been supplied in several submittals by one of our competitors in an effort to have specifiers approve their products and at the same time to promote their efforts to discredit SSI as a less than scrupulous manufacturer.

They did this by taking incomplete excerpts from the standards and using them in an attempt to make the specifiers think that the standards say something entirely different from what they actually say. The effort was to convince specifiers that surge testing using a Category A ring-wave at a level other than 6,000 volts is not a valid test parameter. In particular, testing at the 2,000 volt level was questioned – implying that exposure to this level of transient activity presents no risk to equipment. Hence, they claim, SPD’s that offer frequency responsive circuitry to address that level of transient activity are not a viable product. Now there’s a stretch for you!

Their claim is simply not consistent with IEEE Std. C62.41.1-2002 (surge environment) and C62.41.2-2002 (test waveforms). (See “Surge Suppression 103” - October 2011 that deals with test waveforms and parameters beyond the UL 1449 Standard Voltage Protection Rating waveform, specifically the ring-wave tests.)

Here’s what they claimed:


- Below left is an excerpt from ANSI/IEEE C62.41-1991 showing the 67A A1 Ringwave.
- Below right is an excerpt from ANSI/IEEE C62.41.2-2002 showing the A Ringwave, which is the old A3 relabeled as 'A' (compare current and voltage). Note that the 'A'/A3 test is more stressful than the A1, making 'A'/A3 a more severe test.

This is what the standard “really” says:

IEEE Std C62.41.2-2002
IEEE RECOMMENDED PRACTICE ON CHARACTERIZATION OF SURGES

6.2 Selection of peak values of standard waveforms

Table 2 through Table 5 include a matrix of location categories, types of surges, peak voltages, and peak currents provided as a guide toward the selection of an appropriate set of design parameters or tests. It is emphasized that these parameters in the matrix can only provide a menu. They are not intended to be mandatory requirements.

Table 2—Standard 0.5 μs–100 kHz Ring Wave
Expected maximum voltage and current surges in Location Categories A and B
Single-phase modes: L-N, L-G, and [L-N]-G
Polyphase modes: L-L, L-G, and [L-L]-G
(See Table 5 for N-G mode)

<table>
<thead>
<tr>
<th>Location Category</th>
<th>Peak values</th>
<th>Effective impedance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage (kV)</td>
<td>Current (kA)</td>
</tr>
<tr>
<td>A</td>
<td>6</td>
<td>0.2</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>0.5</td>
</tr>
</tbody>
</table>

See 4.5 for definition and discussion of location categories.

A 100 kHz Ring Wave may be optional in Category C when front-of-wave response is a concern.


The values shown for Location Categories A and B have been set by consensus to provide guidance and uniformity in test procedures and in SPD selection. Other levels may be negotiated between the parties involved, including the particulars of a situation where the transitions between categories can be specifically assessed.

The effective impedance of the surge source (emulated by a test generator) is defined as the ratio of the peak voltage to the peak current. It has the dimension of a resistance, but it is not a pure resistance (see 6.3.1).
What is thought-provoking is the part of the standard that they elected NOT to include in their claim. It’s apparent that not ALL of the information needed to make an educated assessment was provided. Above is an excerpt from the ANSI/IEEE C62.41.2-2002 and the size and quality of the text makes it difficult to read so I have typed the highlighted part verbatim for clarity.

"\textit{d} The values shown for Location Categories A and B have been set by consensus to provide guidance and uniformity in test procedures and in SPD selection. Other levels may be negotiated between the parties involved, including the particulars of a situation where transitions between categories can be specifically assessed."

Basically this statement says that while the waveforms that are included in the matrices are, by consensus, standard it is acceptable to include other levels of those waveforms if it is desired to demonstrate the performance of a product at those levels. Along with the 6,000 volt level, the Category A Ring-wave at the 2000 volt level (in turn, 67 amps due to the impedance of the generator) does still exist and is part of the Standard (by virtue of note “d” above). Further, the 2,000 volt level or other levels agreed to by the parties involved can be selected to be used as well. That’s the whole truth.

They go on to say:

In our experiences, A1 is a ruse foisted on Specifiers by predatory SPD reps or manufacturers.

- Because A1 is not in the standard, there is no way that a Specifier saw it and decided to specify it. It’s not there. Someone had to blow it into the Specifier’s ear.

- Predatory reps/manufacturers deceptively perpetuate the A1 in an attempt to limit competition and/or create a sole-source situation. Since most SPD manufacturers do not test to obsolete standards nor generate one-off test results, they cannot provide test results for specification compliance purposes. A variation of this includes testing requirements for obscure phase angles such as 180° or 270°.

Such sales tactics speak volumes of the integrity and ethics of certain reps & manufacturers. Few Specifiers appreciate their inherent trust being blatantly violated.

In the real world it is an acceptable practice to differentiate between “standard” products and products that offer performance beyond the “standard” level. Apparently the authors of the C62.41.2-2002 Standard felt the same way. In turn, the authors created this provision for additional test levels.

The Category A 2,000 volt Ring-wave is still very much a part of the surge environment to which we all subject our valuable equipment on a daily basis. Interestingly, these type surge events occur at all points on the AC sinewave not just at 90 degrees – further, surges occurring at other phase angles often produce differing results and failures within equipment. Because of this, there is nothing obscure about testing at other phase angles and testing at those phase angles is both prudent and necessary to be able to properly assess performance. The Standard does not dictate the phase angle at which a product is to be tested.

I WOULDN’T CALL THAT PREDATORY......I CALL THAT DILIGENT!!!
Interestingly enough, this particular manufacturer does not provide test results for any ring-wave waveform for any of their products. On the other hand, SSI not only provides Category A 2,000 volt Ring-wave test results but they, as with all of our measured limiting voltages, are “third-party” certified and documentation is available upon request.

In closing, it would seem counter-productive for a specifier to lower their requirements simply to allow another SPD to qualify for a project when the specifier’s requirements have repeatedly been shown to produce the desired results of protection of the equipment within the power distribution system. Maybe I’m old fashioned, but if you want your product to be approved for a specifier’s project, you manufacture a product that meets or exceeds the project specification. The object is to improve the quality of the system protection and the products being offered, not lower the expectations for those products.

So, I restate my words of caution to you: If you want a quality product, specify a quality product and hold your spec. Base your qualifications on third party certified performance with repeatable test parameters. Remember, the primary purpose of a surge protective device? It is simply to reduce the transient voltage surge energy (let through voltage) to a level that is not damaging to the load equipment. In today’s electrical environments that means lower let through voltages. Anything else is secondary!

For additional information, contact your SSI Representative or call 1-888-987-8877.